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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,485	04/15/2005	Junji Yumoto	14321.69	8722

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EXAMINER

NIU, XINNING

ART UNIT	PAPER NUMBER
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2828

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/531,485	Applicant(s) YUMOTO ET AL.	
	Examiner Xinning(Tom) Niu	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37-45,47-52,54-59,61-66,68-73 and 75-97 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 37-45,47-52,54-59,61-66,68-73 and 75-97 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/15/2007, 11/01/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 37-45, 47, 49, 50-54 56, 57, 58, 59, 61, 63, 64, 65, 66, 68, 70, 71, 72, 73, 75, 77-97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa et al. (2004/0027648) in view of Corsini et al. (5,796,764).

3. Regarding claim 37, Furukawa et al. discloses a first laser diode and second laser diode generating laser beams of different wavelengths, a nonlinear optical crystal that generates a sum frequency from the light of the two lasers. The laser apparatus can also function without the reflective surfaces ([0037]). The sum frequency satisfies the relationship of $\frac{1}{\lambda_1} + \frac{1}{\lambda_2} = \frac{1}{\lambda_3}$ and wherein the wavelength of the sum is 589.3 nm ([0035], [0036], [0043], Figure 1). Furukawa et al. do not disclose: two polarization maintaining fibers coupled to the first and second laser, a multiplexer for multiplexing outputs of two polarization maintaining fibers, the first laser oscillates in a multimode. However, Corsini et al. teaches a pump laser coupled polarization maintaining fiber (23)

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and a multiplexer (41) (Figure 1, Col 6-8). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify optical waveguide apparatus as taught by Furukawa et al. by coupling the fibers to each laser device and also adding the multiplexer in order to maintain the polarization of the light waves and also to combine or separate different wavelengths from multiple input signals. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first laser diode oscillate in multimode since it is well known in the art that multimode lasers are easier to manufacture than single mode lasers.

4. Regarding claim 38, Furukawa discloses the nonlinear crystal has a periodic

structure that satisfies $\frac{2\pi m_3}{\lambda_3} = \frac{2\pi m_1}{\lambda_1} + \frac{2\pi m_2}{\lambda_2} + \frac{2\pi m_2}{\Lambda}$ ([0053], [0054]).

5. Regarding claims 39-41, 43, 44, 45 Furukawa teaches a nonlinear optical crystal having a waveguide structure ([0046]), a first laser and second laser emitting at the desired wavelength range and the two laser being DFB lasers ([0043], [0044]).

6. Regarding claim 42, Furukawa et al. discloses a first laser with oscillation wavelength 980nm-1080nm and a second laser with oscillation wavelength 1300nm - 1400nm. Furukawa et al. do not disclose first wavelength of 940nm and second wavelength of 1565nm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the range of the emission wavelength of the lasers, since it has been held that where the general conditions

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of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

7. Regarding claim 47, Furukawa et al. teaches that the first and second lasers are semiconductor lasers. Furukawa et al. do not teach polarization maintaining fibers having a fiber Bragg grating. However, Corsini et al. teaches polarization maintaining fibers with Bragg gratings (Col 7):

8. Regarding claim 49, Furukawa et al. discloses the limitations of claim 37 with a first laser with a different oscillation wavelength for the first and second laser. Furukawa et al. do not disclose: two polarization maintaining fibers coupled to the first and second laser, a multiplexer for multiplexing outputs of two polarization maintaining fibers, the first laser oscillates in a multimode. However, Corsini et al. teaches a pump laser coupled polarization maintaining fiber (23) and a multiplexer (41) (Figure 1, Col 6-8). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify optical waveguide apparatus as taught by Furukawa et al. by coupling the fibers to each laser device and also adding the multiplexer in order to maintain the polarization of the light waves and also to combine or separate different wavelengths from multiple input signals. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first laser diode oscillate in multimode since it is well known in the art that multimode lasers are easier to manufacture than single mode lasers. It would have been obvious to one having

ordinary skill in the art at the time the invention was made to modify the range of the emission wavelength of the lasers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

9. Regarding claim 50, Furukawa discloses the nonlinear crystal has a periodic

structure that satisfies $\frac{2\pi n_3}{\lambda_3} = \frac{2\pi n_1}{\lambda_1} + \frac{2\pi n_2}{\lambda_2} + \frac{2\pi n_2}{\Lambda}$ ([0053], [0054]).

10. Regarding claim 51, please see the rejection for claim 39.

11. Regarding claim 52, please see the rejection for claim 43. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the range of the emission wavelength of the lasers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

12. Regarding claim 54, Furukawa et al. teaches that that the first and second lasers are semiconductor lasers. Furukawa et al. do not teach polarization maintaining fibers having a fiber Bragg grating. However, Corsini et al. teaches polarization maintaining fibers with Bragg gratings (Col 7).

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13. Regarding claim 56, please see the rejection for claim 49.
14. Regarding claim 57, please see the rejection for claim 50.
15. Regarding claim 58, please see the rejection for claim 51.
16. Regarding claim 59, please see the rejection for claim 52.
17. Regarding claim 61, please see the rejection for claim 54.
18. Regarding claim 63, please see the rejection for claim 49.
19. Regarding claim 64, please see the rejection for claim 50.
20. Regarding claim 65, please see the rejection for claim 51.
21. Regarding claim 66, please see the rejection for claim 52.
22. Regarding claim 68, please see the rejection for claim 54.
23. Regarding claim 70, please see the rejection for claim 49.
24. Regarding claim 71, please see the rejection for claim 50.
25. Regarding claim 72, please see the rejection for claim 51.
26. Regarding claim 73, please see the rejection for claim 52.
27. Regarding claim 75, please see the rejection for claim 54.

28. Regarding claim 77, Regarding claim 49, Furukawa et al. discloses the limitations of claim 37 with a different oscillation wavelength for the first; the two laser being DFB lasers ([0043], [0044]). Furukawa et al. do not disclose: two polarization maintaining fibers coupled to the first and second laser, a multiplexer for multiplexing outputs of two polarization maintaining fibers, the first laser is a semiconductor laser in a single mode oscillation, the second laser is a DFB laser, the polarization maintaining

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fiber coupled to the second laser has a fiber Bragg grating, lasers operating at the claimed wavelength range. However, Corsini et al. teaches a pump laser coupled polarization maintaining fiber (23) and a multiplexer (41) and polarization maintaining fibers with Bragg gratings (Figure 1, Col 6-8). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify optical waveguide apparatus as taught by Furukawa et al. by coupling the fibers to each laser device and also adding the multiplexer in order to maintain the polarization of the light waves and also to combine or separate different wavelengths from multiple input signals. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first laser diode oscillate in single mode since it is well known in the art that laser diode can operate in single mode. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the range of the emission wavelength of the lasers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

29. Regarding claim 78, Furukawa discloses the nonlinear crystal has a periodic

structure that satisfies $\frac{2\pi n_3}{\lambda_3} = \frac{2\pi n_1}{\lambda_1} + \frac{2\pi n_2}{\lambda_2} + \frac{2\pi n_2}{\Lambda}$ ([0053], [0054]).

30. Regarding claims 79 Furukawa teaches a nonlinear optical crystal having a waveguide structure ([0046]).

31. Regarding claim 80, please see the rejection for claim 77.
32. Regarding claim 81, please see the rejection for claim 78.
33. Regarding claim 82, please see the rejection for claim 79.
34. Regarding claim 83, please see the rejection for claim 77.
35. Regarding claim 84, please see the rejection for claim 78.
36. Regarding claim 85, please see the rejection for claim 79.
37. Regarding claim 86, please see the rejection for claim 77.
38. Regarding claim 87, please see the rejection for claim 78.
39. Regarding claim 88, please see the rejection for claim 79.
40. Regarding claim 89, please see the rejection for claim 77.
41. Regarding claim 90, please see the rejection for claim 78.

42. Regarding claim 91, please see the rejection for claim 79.
43. Regarding claim 92, please see the rejection for claim 77.
44. Regarding claim 93, please see the rejection for claim 78.
45. Regarding claim 94, please see the rejection for claim 79.
46. Regarding claim 95, please see the rejection for claim 77.
47. Regarding claim 96, please see the rejection for claim 78.
48. Regarding claim 97, please see the rejection for claim 79.
49. Claims 48, 55, 62, 69, 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa et al. (2004/0027648) in view of Corsini et al. (5,796,764) and Hattori et al. (Patent 5,012,478)
50. Regarding claim 48, the combination of Furukawa et al. and Corsini et al. discloses the limitations of claim 47. The two references do not disclose a laser that has a front facet reflectance of 2% or less and a rear facet reflectance of 90% or more.

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However, Hattori et al. disclose a laser with front facet reflection of 2% and a rear facet reflection of 90% (Col 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify optical waveguide apparatus as taught by Furukawa et al. and Corsini et al. with the semiconductor laser as taught by Hattori et al. in order to concentrate the power in the output beam for high power operation.

51. Regarding claim 55, please see the rejection for claim 48.
52. Regarding claim 62, please see the rejection for claim 55.
53. Regarding claim 69, please see the rejection for claim 55.
54. Regarding claim 76, please see the rejection for claim 55.

Conclusion

55. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Response to Arguments

56. Applicant's arguments with respect to claims 37-45, 47-52, 54-59, 61-66, 68-73, 75-97 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xinning(Tom) Niu whose telephone number is 571-270-1437. The examiner can normally be reached on M-T, 7:30-5:00 EST, Alternate Fridays, 7:30-4:00 ES.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Sun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Xinning Niu
11/13/2007

